FOOD OF MALLARD, *ANAS PLATYRHYNCHOS* AT HOKARSAR WETLAND, KASHMIR[1]

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(*With two text-figures*)

The food of mallard (*Anas platyrhynchos*) was determined during the shooting season from November, 1982 to April, 1983 at Hokarsar (34° 06′ N, 74° 05′ E; 1584 m. AMSL). Eighty mallards were obtained and their gut contents analysed. Plant material of 37 species formed 95.46% of the diet. *Oryza sativa* was the principal food and formed 47.01% of the diet. *Myosotis caespitosa, Echinochloa crus-galli, Myriophyllum spicatum* and *Najas gramineum* were the other chief dietary items. Very few invertebrates were consumed because of their limited abundance. The preference and relative intake appears to be directly related to the availability of food.

Introduction

Some three decades ago, mallard (*Anas platyrhynchos*) was one of the common breeding birds of the wetlands of Kashmir and was more or less resident (Bates & Lowther 1952). But the shrinkage of habitat as a result of reclamation and natural succession, illegal egg collection and unfriendly human behaviour have made its position precarious with the result that the birds no longer breed here and are only winter visitors to Kashmir.

In Hokarsar, mallard are very sensitive to changes in the habitat, including the availability of food. The number of birds that migrate to this wetland during winter is also declining greatly. In order to appreciate the significance of this species' habitat preference, population size and density, detailed information on the quality and quantity of food is important from a management point of view. It was with this aim that the present study on feeding habits was undertaken in an attempt to understand its food requirement, which is basic to the intensive management of any wild life.

Study Area

Hokarsar (34° 06′ N lat., 74° 05′ E long.; 1584 m. AMSL) is an important and protected reserve for waterfowl, managed by the Department of Wildlife Protection, J&K Government, situated in the centre of the Valley, about 10 km to the west of Srinagar. The wetland is more or less semicircular in outline, extending in an east-west direction with a surface area of 9.0 sq. km. (Fig. 1). It is fed by a perennial Doodganga stream that originates from Doodganga watershed in Pir Panjal range of the Himalayas and drains into river Jhelum on the northwest by a small stream.

Material and Methods

Eighty mallards were collected from within the study area mostly by capturing and shooting. About 80% of the birds were shot and captured between 0900 hrs. and 1100 hrs. The entire gut of the bird was removed by the technique of Harrison (1960) and food contents

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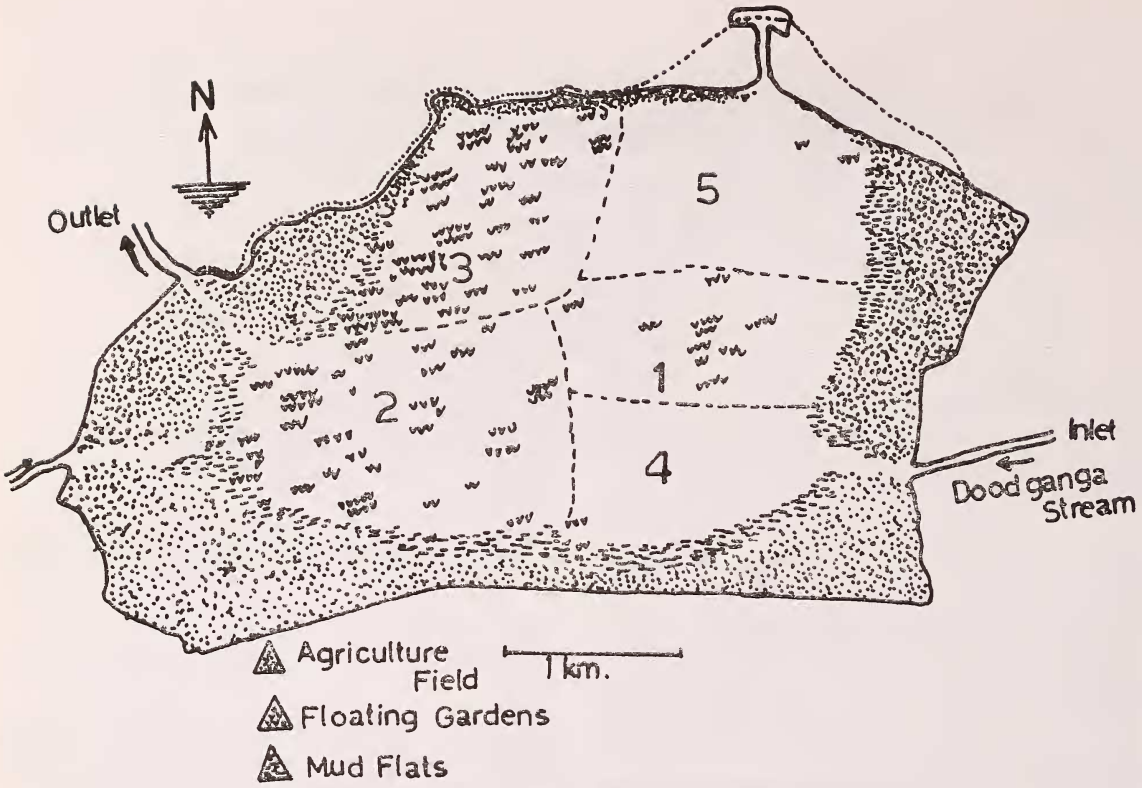

Fig. 1. Map of Hokarsar wetland reserve showing study units.

analysed. Guts which were not examined within six hours of collection were preserved in 4% formalin, after tying the severed ends of the oesophagus and intestine to prevent the loss of contents. Each gut was dissected and the contents of oesophagus and gizzard were washed repeatedly into sieves of various mesh sizes and sorted into organic and inorganic components. The organic material was further separated into animal and plant items and then identified as accurately as possible with the aid of Pennak (1953), Ward & Whipple (1959) and Martin & Barkley (1961). The weight of each plant and animal species, accurate to 0.005 gm. and the volume were calculated by water displacement method in graduated cylinder to 0.01 ml. after drying on a blotting paper.

Results

Mallards started arriving at Hokarsar in small numbers in September and October and the maximum population was in November and December (Fig. 2). Due to cold temperature and paucity of food in January, a sudden decline in the population was noticed. But as favourable conditions returned in February, a build-up of the population was again noticed, which then gradually decreased in March and April before the birds left.

Mallard (*Anas platyrhynchos*) usually fed in small flocks or in pairs and in congregation with other ducks and geese like greylag goose, wigeon, pintail and common teal and was mainly a herbivore. The analysis of gut contents revealed the food to be composed

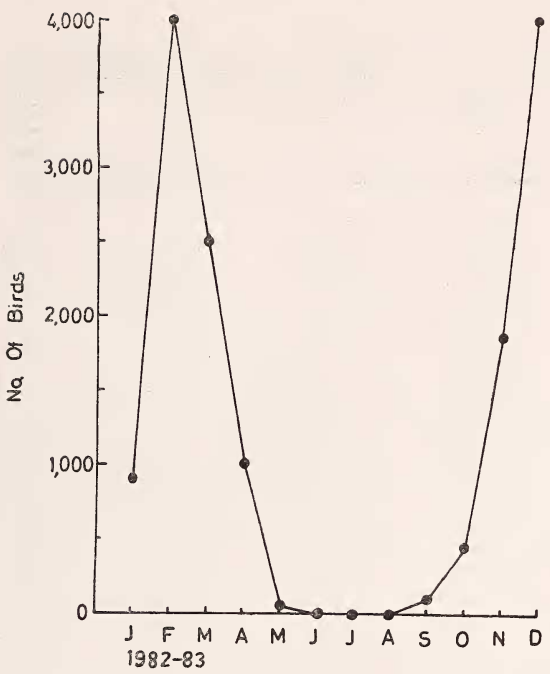

Fig. 2. Estimated population of the Mallard at Hokarsar.

of 37 species of plants and 15 families of animals. The food items with the frequency of occurrence, weight and volume are shown in Table 1.

The plant material comprised of seeds and fruits and other vegetable parts.

The seeds and fruits of 30 plant species belonging to 15 families contributed to the bulk of the diet and were recorded from 98.7% of the guts, forming 70.30% of the diet by weight and 68.43% by volume. *Oryza sativa* appeared to be the chief dietary item recovered in 66.2% of the guts and accounted for 33.7% of food by weight (32.5% volume). *Myosotis caespitosa* recorded in 78.7% of guts appeared to be slightly more preferred than *Oryza sativa,* but formed only 11.0% by weight and 10.40% by volume. *Phragmites communis* was found in 61.2% of the ducks and formed 4.81% of the total weight and 5.28% of the total volume. *Echinochloa crus-galli* accounted for 4.66% by weight and 3.63% by volume. Seeds of five species of Cyperaceae were found in 85% and their combined weight and volume accounted for 2.50% and 2.47% respectively. *Myriophyllum spicatum* was recorded in 81.2% of the guts and formed 3.65% by weight and 3.47% by volume. *Najas gramineum* accounted for 3.47% by weight (2.86% by volume). In addition, seeds of 19 species of plants belonging to 11 families amounted to 5.88% by weight and 7.02% by volume.

Vegetative parts of 10 species of nine families were found in 46.2% of the guts and contributed 25.16% of food by weight (27.44% by volume). *Oryza sativa,* though recorded in only six birds, formed 13.31% of the total food weight (13.86% volume). This was followed by *Salix* twigs, which were recovered from seven birds and accounted for 4.63% of the total food by weight and 6.38% of the total food by volume. *Nymphoides peltatum* was recorded in four birds, being 2.42% and 2.20% of the food by weight and volume respectively. *Carex* sp., *Scirpus* sp., *Solanum tuberosum* and *Trifolium repens* were recorded in only 3.7% of the guts, *Lemna minor* and *Potamogeton* sp. in 2.0% and *Ceratophyllum demersum* in 1.2% of the guts.

The animal component of the food comprised of 15 species of animals found in 35% of the guts, contributing 4.54% of food by weight and 4.13% by volume. However, this consisted mainly of insects and molluscs. Two species of molluscs — *Lymnaea stagnalis* and *Lymnaea* sp. occurred in 12 guts. Ten species of insects, occurring in 1.2—8.7% of the guts, formed 3.98% and 3.53% of the total weight and volume. *Gammarus* sp. and Copepoda (Crustacea) were recorded in 5.0% of the guts and oligochaetes in 2.5%.

TABLE 1

ANALYSIS OF THE GUT CONTENTS OF MALLARD

Food categories	Frequency	% of total freq.	Weight (gms)	% of total wt.	Volume (ml)	% of total vol.
Fruits/Seeds						
Myriophyllum spicatum	65	81.2	14.59	3.65	12.64	3.47
Myosotis caespitosa	63	78.7	43.96	11.0	37.84	10.40
Najas gramineum	55	68.7	13.87	3.47	10.40	2.86
Oryza sativa	53	66.2	134.92	33.7	118.16	32.50
Phragmites communis	49	61.2	19.25	4.81	19.20	5.28
Scirpus setaceous	38	47.5	1.96	0.49	2.16	0.59
Sparganium ramosum	33	41.2	6.30	1.57	6.34	1.74
Eleocharis sp.	33	41.2	0.79	0.19	0.72	0.19
Carex nulbigena	31	38.7	4.80	1.20	3.44	0.94
Polygonum amphibium	30	37.5	0.43	0.11	0.48	0.13
Echinochloa cruss-galli	25	31.2	18.64	4.66	13.20	3.63
Polygonum hydropiper	16	20.0	0.09	0.02	0.24	0.06
Potamogeton natans	15	18.7	0.55	0.13	0.88	0.24
Potamogeton zizi	15	18.7	0.12	0.03	0.24	0.06
Potamogeton crispus	15	18.7	0.04	0.01	0.04	0.01
Unidentified	14	17.5	1.99	0.50	1.60	0.44
Eleocharis palustris	13	16.2	3.13	0.78	2.90	0.79
Polygonum patienta	13	16.2	0.04	+	0.02	+
Alisma plantago aquatica	12	15.0	0.30	0.07	0.80	0.22
Scirpus juncoides	11	13.7	0.06	0.01	0.16	0.04
Sagittaria sagittifolia	11	13.7	0.03	0.008	0.02	+
Hippuris vulgaris	11	13.7	1.09	0.27	1.30	0.35
Rannunculus muricatus	10	12.5	1.83	0.45	1.53	0.42
Nymphaea alba	9	11.2	2.31	0.58	2.20	0.60
Nymphaea candida	6	7.5	2.01	0.50	2.01	0.55
Trapa natans	5	6.2	0.60	0.15	4.00	1.10
Rumex conglomeratus	4	5	0.93	0.23	0.83	0.22
Nymphaea stellata	3	3.7	5.43	1.35	4.01	1.10
Rumex acetosa	3	3.7	1.29	0.32	1.01	0.27
Carex sp.	2	2.5	0.08	0.02	0.40	0.11
Fruits/seeds total	79	98.7	281.46	70.30	248.77	68.43

TABLE 1 (Contd.)

Food catagories	Frequency	% of total freq.	Weight (gms)	% of total wt.	Volume (ml)	% of total vol.
Vegetative parts						
Salix sp.	7	8.7	18.52	4.63	23.20	6.38
Oryza sativa	6	7.5	53.24	13.31	50.40	13.86
Nymphoides peltatum	4	5.0	9.68	2.42	8.0	2.20
Carex sp.	3	3.7	4.0	1.0	3.52	0.97
Scirpus sp.	3	3.7	5.09	1.27	4.23	1.16
Solanum tuberosum	3	3.7	8.20	2.04	7.53	2.07
Trifolium repens	3	3.7	0.92	0.23	0.81	0.22
Lemna minor	2	2.5	1.32	0.33	1.02	0.28
Potamogeton sp.	2	2.5	0.09	0.02	0.02	+
Ceratophyllum demersum	1	1.2	1.33	0.33	1.03	0.20
Vegetative total	37	46.2	102.40	25.16	99.76	27.44
Animals						
MOLLUSCA						
Lymnaea stagnallis	12	15	1.03	0.26	0.93	0.25
Lymnaea sp.	10	12.5	0.44	0.11	0.41	0.11
ARTHROPODA						
INSECTA			13.69	3.98	12.95	3.53
Bagus sp.	7	8.7	11.23	2.80	10.40	2.86
Cricotopus sp.	4	5.0	0.82	0.20	0.80	0.22
Chironomid larvae	4	5.0	0.33	0.08	0.31	0.08
Cybister lateralimarginallis	3	3.7	0.88	0.22	0.75	0.20
DIPTERA (pupae)	3	3.7	0.23	0.58	0.24	0.86
Gerris sp.	2	2.5	0.17	0.04	0.16	0.04
Macromia sp.	2	2.5	0.10	0.02	0.08	0.02
Hydrophilus sp.	2	2.5	0.08	0.02	0.07	0.02
Laccophilus minutus	1	1.2	0.07	0.01	0.08	0.02
Syrphid larvae	1	1.2	0.07	0.01	0.06	0.01
Crustacea						
Gammarus sp.	4	5.0	0.72	0.18	0.69	0.18
Copepoda	4	5.0	t	+	4	+
Oligochaetes	2	2.5	0.03	+	0.03	+
Animal total	28	35	16.12	4.54	15.01	4.13

Total food weight = 399.89 gm Average 4.99 gms/gut
Total food volume = 363.54 ml Average 4.54 ml/gut
+ = <0.01% t = <0.0050 gm and <0.01 ml

Discussion

Waterfowl, in their cyclic migration, experience changing conditions not only among the wetlands and other water bodies but also seasonally within a given ecosystem. A recent extensive accumulation of information on the feeding ecology of waterfowl has indicated that the diet of species changes with availability, time, age and even sex (Sugden 1969, Swanson & Meyer 1973). Mallards, in their search for food, are constantly faced with changing conditions in the complex of aquatic ecosystem. The rapid changes in environmental conditions, such as climate, influence their occurrence in the wetland more than any other factor (Swanson *et al.* 1974). During December, when a peak population of overall waterfowl as that of mallard (over 4000) was built up, there was an intensive competition for food, with the result that the quantity and availability of food became a limiting factor. The availability of food was also affected by severe cold — freezing of the water and snow cover formed on the ground and floating vegetation. This led to a great fall in the population of birds under such conditions. Maitland (1964), Krapu (1974) and Owen & Cook (1977) have suggested the low availability of fauna and other surface food during the extreme cold of winter as the factor limiting the population of mallard. Although mallards are generally equipped to withstand the low temperature the conditions with regard to procurement are not favourable, and hence the exodus from the wetland. Cains (1973) and Bennet and Bolen (1978) also showed that severe weather conditions especially low temperature of January and food shortage are known to cause stress and affect the distribution and movement of mallards. With the improvement of conditions in February, the mallard population reformed again. So differences in the diet reflect the differences in the availability and possibly differing abundance of foods in the different periods as also suggested by Olney (1967) and Thomas (1982).

Although some parts of as many as 37 plants and 15 animal species were recorded in the gut contents of mallard, only a few of these formed the major items, and the feeding habits provided sufficient evidence that mallard changed its feeding habits with season during its stay at the wetland. The variations in the diet may also be due to the presence of some superabundant farm foods (Owen 1976). *Oryza sativa*, which was the major food item of the bird, is knocked to the ground during harvesting in autumn and gets washed into the wetland due to rains and is available to the duck. The preference, and therefore relative intake, appears to be directly related to the availability of food. They seemed to prefer mainly seeds when freely available; on other occasions they would shift to other vegetation and animal matter. These seasonal variations are similar to those described for the species in North Queensland (Lavery 1966).

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